

We claim:

1. A hypodermic injection system comprising:
  - a housing for housing at least one injectate container for an injectate to be injected from the system into a body;
  - 5 a container-holding member for holding the respective injectate containers in position during the injection process for proper injection into the body; and latching and release means for releasably latching said holding member to said housing during the injection process, and for releasing said holding member and the containers held by said holding member, for disposal after the injection process.
- 10 2. A system according to claim 1 wherein said housing houses at least two injectate containers, and said disposable holding member is a structure having openings for holding each of the injectate containers.
- 15 3. A system according to claim 2 and further including guard walls around said openings for preventing splashing of the injectate or blood during an injection process.
4. A system according to claim 2 and further including splash guard walls around the outer edge of said container-holding member for preventing the splashing of the injectate during an injection process.
5. A system according to claim 2 wherein said openings are dimensioned to 20 be press fit with the injectate containers to hold the containers in place.
6. A system according to claim 1 wherein said housing has a front portion, said holding member comprises a front plate, and said latching and release means includes a groove in one of said front plate and said housing and a releasable latching member in the other of said front plate and said housing for releasably entering said 25 groove to latch said front plate to said housing.
7. A system according to claim 2 and further comprising actuatable injectate release means for applying pressure on the respective injectate containers to transmit injectate from said containers for the injection process, and manually operable trigger means for actuating said injectate release means.
- 30 8. A system according to claim 7 wherein said injectate release means comprises energy storage means for storing energy to be applied to the respective

injectate containers, and wherein said trigger means actuates said storage means to cause said energy storage means to apply energy to the respective containers and transmit the injectate from the containers.

9. A system according to claim 7 wherein said energy storage means  
5 comprises at least one spring, a latch for holding the spring in a set condition, and wherein said trigger means comprises a release trigger for releasing said latch to commence the injection process.

10. A system according to claim 1 wherein said locking and release means comprises at least one locking member for cooperating with said container-holding  
10 member to lock said holding member to said housing, means for releasing said locking member to enable said holding member to be properly positioned on said housing and for activating said locking member to lock said properly positioned holding member to said housing, and ejection means for ejecting said holding member and the respective containers held by said holding member from said housing.

15 11. A system according to claim 10 wherein said holding member is a plate with a peripheral edge having a groove, and wherein said locking member enters said groove to lock said plate to said housing, said locking member being removable from said groove to release said plate.

12. A hypodermic injection system according to claim 1 and further  
20 including at least two injectate containers, said holding member holding said containers in proper position.

13. A system according to claim 12 wherein said injectate containers are disposable cartridges, said cartridges each including an injectate channel having injectate nozzles, and wherein said holding member comprises cartridge holders for holding said  
25 cartridges for dispensing injectate through said respective channels during the injection process.

14. A system according to claim 13 wherein at least one of said cartridges are inactive cartridges having pseudo-channels which are constructed to appear as injectate channels but are non-functional as channels, and said inactive cartridges have externally  
30 visible surfaces adjacent said pseudo-channels being coded to appear differently from corresponding surfaces of the active cartridges.

15. A system according to claim 12 wherein said injectate containers are disposable injectate cartridges, and wherein said holding member comprises cartridge-holding surfaces for holding said cartridges in position to dispense injectate, said injectate cartridges comprising:

5           an outer wall having an inner wall surface defining an inner chamber;  
          a plunger engaging said inner wall surface and being movable in said chamber, said plunger defining an injectate-holding portion of said chamber and said chamber having an injectate dispensing end having an exit nozzle, said dispensing end being configured to engage the respective cartridge-holding surfaces, said plunger being  
10 drivable into said injectate-holding portion to dispense the injectate through said respective nozzles from said respective cartridges during the injection process.

16. A system according to claim 15 wherein said injectate-holding portion of at least one of said cartridges comprising a rupturable seal dividing said holding portion into two compartments, one of said compartments holding a lyophilized part of an  
15 injectate and the other of said compartments holding a predetermined amount of fluid for mixing the components of the injectate.

17. A system according to claim 16 and further including means for rupturing said seal.

18. A system according to claim 1 and further including biasing means for  
20 placing sufficient pressure on said respective containers to force the injectate out of the containers at jet velocity.

19. A system according to claim 12 wherein said injectate containers are six cartridges having injectate exits, said exits being disposed in a rectangular order having three pairs of opposing exits.

25       20. A system according to claim 12 wherein said injectate containers are cartridges having perforators for piercing the skin of a body and through which injectate flows during an injection process.

21. A system according to claim 1 wherein said housing houses an injectate container, and said disposable holding member is a structure having openings for holding  
30 said injectate container.

22. A system according to claim 21 and further including a guard wall around

said opening for preventing splashing of the injectate or blood during an injection process.

23. A hypodermic injection system for dispensing injectate from at least two injectate cartridges, each of said cartridges having a dispensing channel with an exit 5 nozzle, and a plunger for moving through the cartridge to dispense injectate from the cartridge, said system comprising:

a holding member for holding the respective injectate cartridges with said dispensing channels directed in a common direction;

10 ram means movable with respect to each of said cartridges to move the respective plungers for forcing injectate from the cartridges through the dispensing channels and the exit nozzle;

a carriage movable from a set position to a dispensing position for moving said ram means at uniform pressures during an injection process;

15 spring means movable from a cocked position for moving said carriage from the set position to the dispensing position;

carriage resetting means for moving said carriage from the dispensing position to the set position, and for recocking said spring means, to enable the replacement of the injectate containers; and

20 releasable latching means for latching said spring means in the cocked position.

24. A system according to claim 23 and further including a housing for housing said holding member, said ram means, said carriage, said spring means, said latching means, said carriage resetting means and said releasable latching means.

25. A system according to claim 24 and further comprising:

a guard plate near said exit orifices for preventing the splashing of injectate from said channels.

26. A system according to claim 23 wherein said carriage resetting means comprises a cam follower operatively connected to said carriage and a cam configured for moving said cam follower and said carriage from the dispensing position to the set 30 position.

27. A system according to claim 23 and further including a housing having a

fixed wall for said spring mean, and wherein said spring means comprises at least one spring having one end engaged with said fixed wall, and the other end movable to the cocked position when said carriage moves to the set position, said set of springs moving said carriage from the set position to the dispensing position in response to release of  
5 said latching means.

28. A system according to claim 27 wherein said spring means further includes movable rods associated with the respective springs for guiding and positioning said springs, said rods having a wall for engaging the other end of the respective springs and being movable in response to movement of said carriage from the dispensing  
10 position to the set position for moving said respective springs to the cocked position and wherein said latching means comprises a first latching member extending from said housing and a second latching member on said rods, said first and second latching members having one condition for holding said rods and said respective springs in the cocked position and a second condition for releasing said rods and said respective  
15 springs, said respective springs then moving said carriage assembly to the dispensing position.

29. A system according to claim 23 wherein said carriage assembly resetting means comprises a cam follower operatively connected to said carriage and a cam movable from an initial position to a final position and configured for moving said cam  
20 follower to move said carriage from the dispensing position to the set position, and a trigger for moving said cam from the final position to the initial position and for releasing said latching means to release said latching means to effect the movement of said spring means from the cocked position to move said carriage from the set position to the dispensing position.

25 30. A system according to claim 28 and further including a solenoid responsive to sensing signals for releasing said first latching member to unlatch said spring means.

31. A system according to claim 23 wherein said carriage resetting means comprises a carriage resetting apparatus for being operable for moving said carriage from  
30 the dispensing position to the set position, and a drive apparatus movable for operating said resetting apparatus, said drive apparatus being configured to be moved by a

correspondingly configured motor driven device.

32. A system according to claim 31 wherein said carriage resetting apparatus is a cam follower for moving said carriage from the dispensing position to the set position, and said drive apparatus is a cam operatively connected to said cam follower,  
5 said cam being rotatable by a motor and configured to move said cam follower and said carriage from the dispensing condition to the set position, and said latching means latching said spring means in the cocked position in response to movement of said carriage to the set position.

33. A system according to claim 31 and further including:

10 a housing for housing said holding member, said ram means, said carriage assembly, said spring means, said carriage assembly resetting apparatus, said drive apparatus and said releasable latching means; and

said system further comprising a handle attached to said housing, said handle including:

15 a motor;

a movable tool driven by said motor for engaging said drive apparatus to operate said carriage resetting apparatus for moving said carriage from the dispensing position to the set position; and

a power input apparatus for supplying electric power to said motor.

20 34. A system according to claim 31 and further including:

a housing for housing said holding member, said ram means, said carriage, said spring means, said carriage resetting apparatus, said drive apparatus and said releasable latching means; and

25 a loading station for cooperating with said housing to operate said carriage resetting apparatus, said loading station including a motor and a movable tool for engaging said drive apparatus to operate said carriage resetting apparatus for moving said carriage from the dispensing position to the set position.

35. A system according to claim 23 and further including sensing means for emitting a sensing signal to indicate the presence or absence of at least one cartridge held  
30 by said holding member, and wherein said releasable latching means operates in response to the presence or absence of the sensing signal.

36. A station for re-energizing a hypodermic injection system, the injection system having a mechanical energy storing apparatus for releasing stored energy when the system makes an injection, the mechanical energy storing apparatus having an input mechanism for cooperating with a re-energizing mechanism, said station comprising:

5 an energy transferring apparatus for transferring energy from an energy source;

a re-energizing mechanism for transmitting energy from said energy transferring apparatus to the input mechanism of the energy storing apparatus, said re-energizing mechanism cooperating with the input mechanism to effect the transmission  
10 of energy from said energy transferring apparatus to the mechanical energy storing apparatus.

37. A station according to claim 1 wherein the injection system has a predetermined external configuration and the input mechanism has a drivable surface for receiving energy to be stored in the energy storing apparatus, and wherein said re-energizing apparatus has a drive surface for cooperating with the drivable surface to re-energize the energy storing apparatus of the injection system.  
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38. A station according to claim 37 wherein the input mechanism comprising a cam mounted on an axle and the drivable surface is a surface of the axle, and wherein said drive surface of said re-energizing apparatus is a device for contacting the drivable  
20 surface and rotating the axle to rotate the cam.

39. A station according to claim 37 wherein the injection system has a predetermined external configuration, and said station includes at least one nesting apparatus for receiving and supporting the injection system, and wherein said drive surface cooperates with the drivable surface of the injection system to re-energize the  
25 energy storing apparatus of the system.

40. A system according to claim 39 wherein the energy storing apparatus of the injection system is at least one spring, and said re-energizing mechanism cocks the spring.

41. A station according to claim 40 wherein the injection system further  
30 includes a rotatable cam for operating a device to cock the spring and the drivable surface is connected to the cam, and wherein said drive surface cooperates with the

drivable surface to rotate the cam and cock the spring.

42. A station according to claim 39 wherein the injection system includes apparatus for receiving disposable cartridges holding injectate, and wherein said station further including a supporting device to hold the injection system for reloading the 5 injection system with fresh cartridges containing injectate.

43. A station according to claim 36 wherein said re-energizing mechanism includes a manually operable member for transmitting energy from a person operating said member to the mechanical energy storing apparatus.

44. A station according to claim 36 wherein said re-energizing mechanism 10 includes a compressed gas operable member for transmitting energy from the compressed gas to the mechanical energy storing apparatus.

45. A station according to claim 36 wherein said re-energizing mechanism includes an hydraulically operable member for transmitting energy from the device exerting pressure on the hydraulic fluid to the mechanical energy storing apparatus.

15 46. A station according to claim 36 wherein said re-energizing mechanism includes an ignitable gas operable member for transmitting the ignition energy to the mechanical energy storing apparatus.

47. A station according to claim 36 wherein said re-energizing mechanism includes an electrically operable member for transmitting electrical energy to the 20 mechanical energy storing apparatus.